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ABSTRACT

Previous research has found that sympathetic arousal will cue information stored in memory with a similar level of arousal. To investigate the effect of arousal on the interpretation of other people's emotions, three studies were conducted. In the first study, 37 adult tennis players, who were either about to play tennis or who had just played, rated positive or negative phrases on a 7-point scale indicating serenity/joy (for the positive statements) or depression/anger (for the negative statements). An analysis of the results showed that arousal biased judgments of positive stimuli toward joy and judgments of negative stimuli toward anger. In the second study, 16 college students rated slides on a 5-point scale indicating the serenity/joy or depression/anger dichotomies, either prior to or following a soccer practice. The results of this study replicated the results of the first study for positive stimuli. However, no support for an effect of negative stimuli was demonstrated. In the third study, 39 college students rated slides, as in the second study, either before or after an exercise period. The results again replicated the results of the other studies in that increases in arousal biased judgments of positive stimuli but not judgments of negative stimuli. (BL)

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Effects of Arousal on Interpreting Other People's Emotions*

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Effects of Arousal on Interpreting Other People's Emotions

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Based on evidence that arousal cues information from memory which has been associated with a similar level of arousal in the past (Clark, Milberg & Ross, 1983) and on evidence that people base judgments on the information that is most available to them (Tversky & Kahneman, 1974) it was hypothesized that: 1) increases in automatic arousal would increase the likelihood of subjects interpreting positive statements and positive physical appearances (including information about facial expressions) as indicating joy rather than serenity, and that 2) increases in arousal would also increase the likelihood of subjects interpreting negative statements and negative physical appearances as indicating anger rather than sadness or depression. Three studies are reported, each of which support the former but not the latter hypothesis. Explanations for why arousal had the predicted effects on positive but not on negative judgments are offered.

The research reported here was designed to test the general hypothesis that a person's level of sympathetic arousal will bias that person's judgments of others' emotional states such that those others will be perceived as experiencing emotions associated with a similar level of arousal. In other words, highly aroused people may be more likely than usual to perceive others as feeling high arousal emotions such as joy or anger while people experiencing low levels of arousal may be more likely than usual to perceive others as feeling low arousal emotions such as serenity, sadness, or depression.

The reasoning behind this hypothesis begins with our recent finding that sympathetic arousal cues material stored in memory with a similar level of arousal (Clark et al., 1983). Clark et al. (1983) conducted two studies in which each subject learned some phrases while experiencing high arousal and other phrases while experiencing low arousal. Later, each subject was unexpectedly asked to recall as many phrases from both lists as possible when experiencing either high or low arousal. In both studies, subjects recalled material best when their state of arousal at recall matched their state of arousal at learning. These effects held even when the manipulations of arousal at learning (exercise vs. relaxation) were very different from the manipulations of arousal at recall

(viewing an erotic film vs. viewing an educational film).

This finding led to the prediction that arousal ought to bias people's judgments of others' emotions. Such biased judgments might result from a two stage process. First, when a highly aroused person focuses attention on a stimulus, the stimulus will prime stimulus related material from memory and the arousal should prime arousal related material. Consequently, arousal related thoughts about the stimulus ought to be more likely to come to mind than usual. Consider for example what happens when a person sees a smiling other. If the person is highly aroused, that high arousal combined with perception of the other's smile may bring thoughts of joy to the person's mind. On the other hand, if the person is experiencing low arousal, the low arousal combined with perception of the other's smile may bring thoughts of serenity to the person's mind.

Second, information which comes to mind most easily ought to influence judgments about the stimulus (c.f. Tversky & Kahneman, 1974). Continuing with the example above, if high arousal does indeed make thoughts of joy more available, then if asked what a smiling other is feeling a highly aroused person ought to be more likely than usual to say "joy". Similarly, if low arousal does indeed make thoughts of serenity more available, then if asked what a smiling other is feeling a person experiencing low arousal ought to be more likely than usual to say "serenity". (Similar examples could, of course, be given for negative emotions.)[1]

Given the above reasoning, the present studies were conducted to test the following specific hypotheses:

1. People experiencing high arousal will be more likely than those experiencing low arousal to interpret photos of people with positive expressions and to

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[1]We might note at this point that this overall analysis is similar to one made by Isen (1975; Isen, Shalker, Clark, & Karp, 1978) of why positive feeling states may cause judgments of objects in the environment and behavior to become more positive. Indeed, our work grew out of that earlier work.

interpret positive statements as indicating joy rather than serenity.

2. People experiencing high arousal will be more likely than those experiencing low arousal to interpret photos of people with negative expressions and to interpret negative statements as indicating anger rather than sadness or depression.

These hypotheses were examined in three studies, including two field studies and a laboratory study.

STUDY 1

Method

Subjects. Thirty-seven adult tennis players served as subjects. All were about to play tennis or had just played tennis in a city park. Each was approached by an experimenter who asked them to volunteer for a short project. No person refused.

Stimulus materials. Prior to actually conducting the study, five positive and five negative statements which a person might make were selected from a large pool of possible statements. They were selected on the basis of judges' ratings which indicated that the positive statements were ambiguous in terms of whether they indicated serenity or joy and that the negative statements were ambiguous in terms of whether they indicated depression or anger. The positive statements were: (1) "Just look at that sunset," (2) "I should have more days like today," (3) "For the most part people are pretty nice," (4) "Life is going well," and (5) "I really like my work." The negative statements were: (1) "I'm tired of this," (2) "I'd like to be left alone," (3) "I'm so dumb," (4) "I can't do this," and (5) "Why did that happen?"

Procedure. The experiment began with the experimenter going to a city park with many tennis courts. Around the courts are benches where players wait for courts to become free. Upon her arrival, the experimenter unobtrusively assigned each waiting person to either a high or low arousal condition.

Those subjects assigned to the low arousal condition (n=17) were then approached

prior to playing and asked to participate in a short psychology experiment, while those assigned to the high arousal condition (n=20) were approached with the same request after playing tennis. Each subject was also randomly assigned to rate either the positive or the negative phrases. Nine of the low arousal subjects rated positive statements; eight rated negative ones. Ten of the high arousal subjects rated positive statements; ten rated negative ones.

After agreeing to participate, each subject was given a sheet with five statements, and asked to judge the statements in terms of whether they indicated serenity or joy (for the positive statements) or depression or anger (for the negative statements). Specifically, each statement was followed by a 7 point scale, with "1" indicating that the phrase was closer to indicating "serenity" (or "depression") and "7" indicating it was closer to indicating "joy" (or "anger"). After filling out these scales, each subject was thanked and debriefed.

Results

The dependent measures were the sums of each subject's ratings of five phrases. For subjects in the positive conditions, a higher sum indicated a greater tendency to perceive joy rather than serenity. For subjects in the negative conditions, a higher sum indicated a greater tendency to perceive anger rather than depression.

Consider effects of arousal on positive judgments first. Having played tennis biased these judgments as predicted. The pre-tennis subjects' ratings of these statements (mean sum = +15.22) were significantly lower than the post-tennis subjects' ratings of the same statements (mean sum = +27.50), $t(17) = +12.9$, $p<.0001$. Having played tennis also biased the negative judgments as predicted. The pre-tennis subjects' ratings of these statements (mean sum = +19.50) were significantly lower than the post-tennis subjects' ratings of the same statements (mean sum = +23.40), $t(16) = +3.4$, $p<.004$.

Discussion

The results of the first study clearly supported our hypotheses. Arousal biased judgments of positive stimuli toward joy and judgments of negative stimuli toward anger. However, the results of this study must be interpreted with caution, as there is a plausible alternative explanation for these results. Specifically, prior to playing tennis, there is no particular reason to suspect our subjects were feeling either particularly joyous or angry rather than particularly serene or depressed. However, following tennis, some of our subjects (those who won) may have felt joyous while others (those who lost) may have felt angry. Thus, the joy of a subset of our post-tennis subjects (rather than arousal per se) may have biased our High arousal-Positive group's scores toward joy rather than serenity while the anger of a subset of our High arousal-Negative group's (rather than arousal per se) may have biased their judgments of the negative statements toward anger rather than depression.

We did not ask subjects whether they had won or lost, so it was difficult to rule out this alternative explanation. However, in the case of the results obtained for ratings of the positive statements, there was no overlap in the scores between the high and low arousal subjects. Thus, our alternative explanation involving the assumption that some subset of our subjects was experiencing joy as a result of winning (perhaps as many as half) can not entirely explain this result. To support this argument, we eliminated half our data from the positive condition -- specifically that half from those subjects who gave the highest ratings of joy (i.e., the data most favorable to our hypothesis). Then we recalculated means and performed a second t test using data from the five remaining high arousal subjects and from all the subjects in the low arousal condition. The new test indicated that there was still a significant difference between conditions $t(12) = +9.61$, $p<.0001$. Thus, despite the potential alternative explanation, our results still support the hypothesis that increased arousal will bias people's perceptions of smiling others toward

joy.

We performed a similar re-analysis on our subjects' judgments of the negative statements. We eliminated the five highest scores in the high arousal condition (i.e., those indicating greatest anger). Then we repeated our analysis using the remaining subjects in that condition and all subjects in the low arousal condition. While the difference between the means was still in the expected direction, it was no longer significant. Thus, the first study did not provide clear evidence for arousal biasing perception of negative stimuli.

STUDY 2

For the second study we chose to have subjects rate photos of people with positive facial expressions in terms of whether the person pictured was feeling serenity or joy and photos of people with negative facial expressions in terms of whether the person pictured was feeling depression or anger. They rated these slides while they were experiencing low or high arousal. Differences in arousal were obtained by asking people to rate the photos prior to some naturally occurring soccer practice in which scores were not kept and no one won or lost (an important consideration in light of the alternative explanation posed above) or following that exercise.

Method

Subjects. Subjects were 16 university students between the ages of 18 and 35 who met twice a week to play soccer.

Stimulus materials. The stimulus materials consisted of six photos, three of which showed people with positive facial expressions and three showed people with negative facial expressions. These were selected from a larger pool of photos on the basis of judges' ratings which indicated that the positive photos were ambiguous in terms of whether they indicated serenity or joy and that the negative photos were ambiguous in terms of whether they indicated depression or anger.

Procedure. Subjects were assigned to be interviewed before (low arousal) or after (high arousal) playing soccer. This was done on the basis of shirt color. On one day, subjects wearing bright shirts participated before the game (normal arousal condition), and those wearing dark shirts participated after the game (high arousal condition). On a second day on which testing was continued, this decision rule was reversed. (Shirt color was not determined by team membership. Players came to the game wearing whatever they wished and during the game team members could be identified because half removed their shirts.)

The experimenter, himself a member of the group, told each subject that he was from the psychology department and had to pretest a number of slides for an experiment. After the subject had agreed to look at the slides, the experimenter took out a portable slide viewer and explained the rating scale. Subjects rated three slides of people with positive facial expressions and three slides of people with negative facial expressions. For the positive facial expressions, subjects used a 5-point scale ranging from "closer to serenity" (1) to "closer to joy" (5). For the negative slides, subjects used a 5-point scale ranging from "closer to depression" (1) to "closer to anger" (5). Half the subjects rated the positive slides first, half rated the negative slides first.

Results

The dependent measures were the sums of each subject's ratings of the three positive slides and of the three negative slides. Higher scores for the positive slides indicate a greater tendency to perceive the people depicted as feeling joy rather than serenity. Higher scores for the negative slides indicate a greater tendency to perceive people as feeling anger rather than depression. The means for the positive slides were +7.4 for the Low arousal-Positive subjects and +10.8 for the High arousal-Positive subjects. A t test indicated that, as predicted, there was a significant difference between these two conditions $t(16) = +3.4$, $p<.01$. The means for the negative slides did not differ

significantly. They were +8.3 for the low arousal condition and +9.0 for the high arousal condition.

Discussion

The results of the second study replicate those of the first for positive stimuli, lending further support for our hypothesis that arousal may bias perception of positive stimuli in the ways suggested in the introduction of this paper. However, once again, we failed to find support for a similar effect for negative stimuli. Several explanations for the asymmetry of effects for positive and negative stimuli will be discussed in the general discussion. First, however, a third study designed and carried out to rule out some possible methodological problems in Studies 1 and 2 will be described.

In the third study, unlike the first two, the experimenter collecting the dependent variable was "blind" to experimental conditions. In addition, two other changes were made in the third study to increase the chances of observing an effect of arousal on interpretations of negative stimuli. First, the term anchoring the low arousal end of the negative scale, "depressed," was replaced with the term "sad." We thought it remotely possible that subjects considered the term "depressed" to mean "clinically depressed," a state with which the majority probably had no personal experience. Given that, the absence of any arousal effects on negative judgments might have been due to subjects feeling forced to make negative judgments on bases <u>other</u> than their personal memories. Second, we switched from using single scales anchored by low and high arousal emotion terms to using two separate rating scales for rating each stimulus. In other words, each positive stimulus was rated on one five point scale in terms of the degree of joy depicted <u>and</u> on a separate five point scale in terms of the degree of serenity depicted. Each negative stimulus was rated on one five point scale in terms of the degree of anger depicted <u>and</u> on a separate five point scale in terms of the degree of sadness predicted. We thought it possible that in Studies 1 and 2, subjects thought of serenity and joy as

lying on a single dimension separated only be arousal but of depression and anger as being quite different in ways in addition to degree of associated arousal. If this were so, it might take more than just enhanced arousal to move their judgments away from depression to anger. On the other hand, we felt enhanced arousal might influence judgments about the degree to which pictures reflected either feeling state separately.

STUDY 3

Subjects. Subjects were thirty-nine students who partially fulfilled a course requirement by participating. They were randomly assigned to one of the following four conditions: 1) High arousal-Positive photos, 2) Low arousal-Positive photos, 3) High arousal-Negative photos, and 4) Low arousal-Negative photos.

Stimulus materials. Prior to actually conducting the study, six positive and six negative photographs of people pictures in magazines were selected from a large pool of possible photographs. As in the first two studies, they were selected on the basis of judges' ratings indicating that the positive photos were ambiguous in terms of whether they indicated serenity or joy and that the negative photos were ambiguous in terms of whether they indicated sadness or anger.

Procedure. Upon arrival each subject was greeted by the first experimenter who told the subject the session would include two short studies--pretests for later studies. She would be conducting the first pretest and another person would be conducting the second one. Although unrelated, the pretests were supposedly being run together because each took just fifteen minutes.

Next the first experimenter said she was interested in how various amounts of exercise and relaxation effected people's pulse rates. Therefore she was going to ask the subject to do some mild exercise as well as to relax. The subject's pulse rate would be taken before and after each task. (All subjects were asked at this point if there was any reason why they should not exercise, and were assured that if there was, they would not

have to exercise and would still receive credit. No subject indicated he or she should not exercise.)

Following this explanation, subjects were told they would do one of the first experimenter's two tasks, then participate in the second experimenter's study, and finally return to the first experimenter for the second task. This plan was being followed to allow the subject's pulse following the first task to return to normal prior to the start of the second task.[2] In any case, half the subjects (those in the high arousal condition) were asked to begin with the exercise task; whereas the other half (those in the normal arousal condition) were asked to begin with the relaxation task. Subjects in the high arousal (exercise) condition had their pulse taken, stepped up and down on a cinder block for seven minutes and finally had their pulse taken a second time. Subjects in the normal arousal (relaxation) condition had their pulse taken, relaxed in a lounge chair for seven minutes, then had their pulse taken a second time.[3]

After completing the first experimenter's first task, all subjects were directed to the second experimenter who did not know their arousal condition. The first experimenter introduced the subject to the second experimenter, asked the second experimenter to send the subject back to do her second task, and left the room. The second experimenter

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[2]In fact, as will become evident shortly, at the conclusion of the study, subjects in the high arousal condition had only performed the exercise task and subjects in the low arousal condition had only performed the relaxation task. However, all subjects were led to believe they would do both because it was felt that simply being told that one was expected to perform the relaxation or the exercise task might produce an emotional response. Given this, we told subjects in both arousal conditions that they would be performing the same two tasks to keep such reactions comparable.

[3]Because it takes some time to locate and count a person's pulse - time during which arousal would be dropping - and because prior research had clearly indicated the effectiveness of these manipulations (Clark et al., 1983), the experimenter actually did not measure pulse rates. She simply pretended to efficiently do so for purposes of the cover story.

said he was interested in moods. He wanted to know if it was possible to infer a person's moods from photographs. To study this, the subject was to look at photographs and to judge the emotion being felt by the person depicted. Half the subjects looked at the six positive photos and rated each on a seven point scale in terms of how joyous the depicted person felt from 1 (not at all joyous) to 7 (very joyous). These subjects also rated the same photographs on a second scale in terms of how serene the person felt from 1 (not at all serene) to 7 (very serene). The remaining half of the subjects looked at the six negative photos and rated each on two scales in terms of how angry and in terms of how sad the person seemed to be. These scales also ranged from 1 (not at all angry or sad) to 7 (very angry or sad). Finally subjects were probed for suspicion and fully debriefed.

The dependent measure for the positive stimuli in the third study was the difference between the sum of subjects' ratings of the five positive photographs on serenity and the sum of their ratings on joy. Since subjects' scores on the serenity scale were subtracted from their scores on the joy scale, higher scores on this measure indicate a greater tendency to judge the photographs as indicating joy rather than serenity. The dependent measure for the negative stimuli in the third study was the difference between the sum of subjects' ratings of the five negative photographs on sadness and on anger. Since sadness scores were subtracted from anger scores, higher scores on this measure indicate a greater tendency to judge the photographs as indicating anger rather than sadness.

Once again the effects of arousal on judgments about the positive photographs were as predicted. A t test revealed the difference scores from the high arousal subjects were significantly higher (mean = +2.1) than the difference scores from the low arousal subjects (mean = -4.9) $t(16) = -2.72$, $p<.05$. In contrast, the mean rating of the high arousal subjects for the negative stimuli (-1.5) was once again not significantly different

from the mean rating for the low arousal subjects (+ .2) t(18) = +.6, N.S.

General Discussion

Our three studies taken together provide clear and consistent evidence for increases in arousal biasing judgments of positive stimuli in such a way as to be seen as indicating joy (a positive high arousal emotion) rather than serenity (a positive low arousal emotion). These results support our reasoning that this should have occurred because: 1) The stimuli themselves primed positive thoughts, arousal primed arousal-related thoughts from memory associated with a similar level of arousal (Clark et al., 1983), and together these effects combined to increase the probability of positive high arousal thoughts (joy) coming to mind in the high arousal conditions and of positive low arousal thoughts (serenity) coming to mind in the low arousal conditions, and 2) These thoughts, being more available than others, biased perception of statements and personal appearances so as to be consistent with them (cf. Tversky & Kahneman, 1974).

The lack of a clear effect of arousal on judgments about negative stimuli is, however, rather puzzling. At this point we can think of three possible explanations for exercise induced arousal failing to have an effect on these judgments. First, joy may be associated with moderate levels of arousal while anger may be associated with high levels of arousal (Schwartz, Weinberger & Singer, 1981). Our manipulation may have elicited only moderate levels of arousal. Consequently, our exercise manipulations may have resulted in arousal levels capable of priming joyful but not angry thoughts.

Second, the patterning of the sympathetic arousal that accompanies exercise might be more similar to that accompanying joy than to that accompanying anger. This too points to the possibility that our exercise manipulations may have resulted in an arousal capable of priming joyful but not angry thoughts.

Finally, serenity and joy may differ from one another primarily in terms of the amount of arousal associated with each while depression and sadness may differ from

anger in more complex ways (see, for example, work on facial expressions reviewed by Eckman, Frisen, & Ellsworth, 1982). Thus, while arousal may be the primary basis for determining whether a smiling other is feeling serenity rather than joy, it may not be the primary basis for determining whether a frowning other is feeling sadness or depression rather than anger.

REFERENCES

Clark, M.S., Milberg, S., & Ross, J. Arousal cues material stored in memory with a similar level of arousal: Implications for understanding the effects of mood on memory. Journal of Verbal Learning and Verbal Behavior, (to appear Oct., 1983).

Eckman, P., Frisen, W.V., & Ellsworth, P. What emotion categories or dimensions can observers judge from facial behavior? In P. Eckman (Ed.), Emotion in the Human Face. New York: Cambridge University Press, 1982.

Isen, A.M. Positive affect, accessibility of cognitions and helping. In J. Piliavin (Chair), Current Directions in Theory on Helping Behavior. Symposium presented at the meetings of the Eastern Psychological Association, New York, 1975.

Isen, A.M., Shalker, T., Clark, M., & Karp, L. Affect, accessibility of material in memory, and behavior: A cognitive loop? Journal of Personality and Social Psychology, 1978, 36, 1-12.

Schwartz, G.E., Weinberger, D.A., & Singer, J.A. Cardiovascular differentiation of happiness, sadness, anger, and fear following imagery and exercise. Psychosomatic Medicine, 1981, 43, 343-364.

Tversky, A., & Kahneman, D. Judgments under uncertainty: Heuristics and biases. Science, 1974, 185, 1124-1131.